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ABSTRACT

Computerized school administration has become one of the most crucial innovations in vocational education in Taiwan in the Republic of China. As these educators begin to design or purchase computerized information systems for their own schools, they must first define their specific information needs. Next, they should pay attention to interrelationships among all the data subsystems in their information systems so as to avoid data redundancy. Care should be taken so that the system is designed in a way that will generate information in a format that meets pertinent regulations and rules. All persons who will use the system, including data processing personnel, faculty members, clerks, and department heads, must work jointly to set up the system, and appropriate training for the end users of the system must be designed and provided. The information system itself should be divided into the following subsystems: personnel, learning resources, student services, facilities and equipment, finance, and instruction. Finally, efforts should be made to (1) help school personnel adjust to the change in organizational climate that will undoubtedly arise after the computerized system is introduced and (2) develop and maintain procedures to provide information security and protect individuals' and organizations' rights to privacy. (MN)

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Vocational Education as an Innovation in the Republic of China— Computerization of School Administration

Frank Tien-Jin Chang

中華民國職業教育之革新—學校行政電腦化

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Vocational Education as an Innovation in the Republic of China —— Computerization of School Administration

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Running head: COMPUTERIZATION OF SCHOOL ADMINISTRATION IN THE REPUBLIC OF CHINA

Abstract

Partly due to school administrators' awareness and partly due to the encouragement of the Ministry of Education, computerized school administration has become one of the most crucial innovations in vocational education in Taiwan, Republic of China. The author believes that an effective computerized school administration system can be divided into six subsystems, which are closely related to each other though seem to be independent. Some points to be taken into consideration in starting to plan a computerized school administration system and other human factors are discussed in the report. Only when the system is well done can we ensure the success of school administration and management.

Introduction

The main goal of school administration is to maximize the utilization of the limited resources, such as manpower (faculties), physical facilities, instructional resources, finance and ideas. It aims to create an optimal teaching and learning environment and achieve quality school education by satisfactorily meeting the needs of faculties and students. School administrators should also make every effort to cope with the out-of-school changes and needs, such as, technological innovations, social resources, occupational displacement, government policies, energy and pollution. It can thereby be expected that students acquire the knowledge, skills and positive attitudes demanded by educators, educational authorities and enterprises to accelerate the national economic development and upgrade morality and technology.

In an attempt to obtain more efficient performance of school administration in Taiwan, Republic of China, we are changing from the traditionally manual way of managing school affairs. Today with the rapid increase in student enrollment, school administrative business, such as instruction, faculty and student services, accounting, and general affairs have become much more complicated than before. Consequently, it becomes

apparent that manual processing often leads to mistakes, inefficiency and even a waste of time. Moreover, as data processing activities in schools have traditionally been grouped by departments, data redundancy becomes a serious problem and data retrieval inconvenient.

Information science has become one of the most important and popular majors in many universities in Taiwan. Also computer-related courses are offered in many schools of secondary and elementary levels. Schools use computers not only for instructional purposes but also for efficiently managing school administrative affairs. Computers are beginning to undertake those mechanical and tedious management routines which allows the school administrators to devote more of their time to judging, analytical and decision-making tasks. We are sure that the computerization of school administration, like office automation for enterprises, will become more and more crucial for better performance of school management in Taiwan. It is indeed a worthy topic of study and research.

Use and Development of Computers

The processing speed and efficiency has been greatly improved since computer was invented in 1945. Fundamentally, the computer is capable of five major functions---input, storage, process, control and output,

which combine to work as a complete automatic data processing unit almost like a human brain. It stores various kinds of data in its memory and reproduces the needed information through its marvelous calculating and analyzing process. Figure 1 shows a basic computer system.

Insert Figure 1 about here

Because of rapid technological innovations, there is about a fifty percent displacement in the job content of high technologies every three years. Computer development has been rapid. It has evolved from the vacuum tube, through transistor and LSI, to the present VLSI within a period of thirty years. A comparison of the four generations of computer is shown in figure 2.

Insert Figure 2 about here

Among those efforts on advanced computer technology including VLSI, artificial intelligence, supercomputers, man-machine interface, software engineering, and knowledge-based expert system are the MCC consortium in the United States, the Fifth Generation Computer Project of Japan, and the ESPRIT program of the European

Community. For instance, Japan's Fifth Generation Computer Project intends to substitute the Knowledge Information Processing System (KIPS) for the traditional Von Neumann machine in 1990. We believe the future impact of such progresses on the world will be immeasurable. Basically, the system consists of three major areas: artificial intelligence, problem-solving and inference system, and knowledge-based data base mechanism. Figure 3 shows its system architecture.

Insert Figure 3 about here

Some people say that the project is only a combination of some existing research plans and that it is nothing special. However, we would be glad to see that it will be carried out in the near future.

With the advances of technology, the size of computers has been reduced; their processing speed, storage capacity, reliability, and accuracy have increased in the past few years. In other words, computers will become smaller, cheaper, and more powerful as well in the future.

In Taiwan, Republic of China, the technological and economical development has made computer use possible and more and more popular for enterprises and institutions in

recent years. And now educators have recognized that it is necessary to use computers to help manage school administrative affairs. Therefore, the computer has begun to play an important role in the school administration in the Republic of China. In preparing for the approach of the age of school business administration, we should first make every effort to systematically organize school affairs and related information. Only in this way can we expect the successful achievement of school administration computerization.

An Information System for the School Administration

It is one thing to recognize that the computer is a powerful tool, but it is another thing to decide what computers can do and how to do. Therefore, the following considerations should be emphasized when we start to plan a computerized administration system.

1. Define the needs To create a computerized school administration system, we first have to recognize that problems and needs exist. We can start with some fundamental questions: Why we use computer for school? What constitutes an worthwhile computer-based system? What effects computer use will have on our school administration? The answers may be: retrieving data

only, retrieval and analysis, making decision, proposing decisions, etc. In other words, the requirements should be carefully measured before the system is designed and purchased.

2. Avoid data redundancy Since complex data relationship and linkage do exist, the data in the system must be well defined and consistently organized. So exclusive attention should be paid to the interrelations among all subsystems.

3. Think of regulations and rules Because the school administration is involved in regulations and rules, the computer-based administration system still need to match the requirements of all regulations and their changes. For example, if the computer reports will be presented to the government, then the reports must provide the information needed.

4. Faculties work together The most important factor in computer-based school administration is people. People including data processing personnel and general faculties such as teachers, clerks, secretaries, and department heads must jointly work together to set up the system.

5. Make the best choice Whether to rent or to buy a computer system depends on the school financial ability. Nevertheless, in choosing a computer system,

some features should be carefully examined, such as cost, usage, memory, market success, physical features and serviceability. Close examination of these helps to ensure that the school information administration system will be used constructively.

6. Educate end users For the computerized school administration system, the effective training of non-technical end-users has become indispensable to high administrative performance. A school can install the most advanced computer system, but unless its users know how to apply that system effectively and accurately, the school's performance will still lag badly. Most of the people who are responsible for developing and installing new systems may concern with hardware and software, but they often forget to do education for their end users. To ensure that the system is used as it was intended, schools should design and provide appropriate training for their faculties.

With the educational goals and school organization in view, we may divide the computerized school administration system into six subsystems: personnel, learning resources, student services, facilities and equipment, finance, and instructions. These information subsystems seem to be independent; in fact they are closely related to each other. Figure 4 shows the

relationships among them. Each of these will be discussed briefly below.

Insert Figure 4 about here

Personnel Information System

Personnel information subsystem stores all personnel data, such as, name, ID number, sex, marriage status, education, position, speciality, etc. From the data base management system, particular users can have access to and retrieve the data needed and produce their reports. Personnel management needs information on the speciality, skills, age, teaching courses, turnover of personnel, and the characteristics of personnel. Through the system, school administrators can quickly obtain the needed reference materials and make decisions.

Financial Information System

The system can help accounting clerks to quickly produce financial reports for their managers and control the use of budget. Traditionally, accounting departments do their finance control by manual processing, and the overexpenditure of funds can easily occur.

Through computerized financial system, manual processing will be reduced and will allow financial administrators to use terminals to make fast assessment

of cash flow, receivable and payable accounts. With computer systems, managers can quickly understand the financial allocations and set priorities in the use of the budget. Because budget control is shared by department managers, accounting personnel have enough time to monitor the use of the budget.

A financial data base must include at least: (a) budget and use of funds by each department, (b) school receivables, (c) invoice transaction file, and (d) monthly statistical reports.

For data security of this system, data entry or storage alteration should be done only by accounting clerks or authorized personnel.

Generally speaking, the following benefits can be obtained from computerized finance system.

1. Easy control of budget With online inquery system, department administrators can check their cash balance before they wish to use their budgets. This will enable them to avoid overdrawing their budget and maintain budget control. Again department administrators can check and follow up invoices transfers easily to reduce human error.

2. Improve reporting system Administrators may use online system to obtain up-to-date and well processed information reports.

3. Reduce clerks' paper work Under computerized financial system, financial reports are produced by computers, and manually processed reports are reduced while lots of manpower is saved.

Facilities and Equipment Information System

School facilities and equipment may be classed in four categories: land, general property, instrument, and non-expendable goods. They include housing, land, desks, chairs, cabinets, teaching equipment, teaching aids, office utilities, as well as shop and laboratory materials, etc.

The major jobs of the school facilities and equipment management are purchasing, updating, maintaining, and recording. The physical devices and record sheets are so sophisticated that management by manual methods is difficult.

By using computers to control all facilities and equipment used in schools, this complex duty can be made easy and time-saving. Computers have the capacity to organize all kinds of facilities and equipment into categories according to their classification numbers. School property listing, classified tables and user's cards are typed out at regular intervals for examination and correction. Thus, each piece of equipment can easily be located and completely utilized.

Learning Resources Information System

Learning resources include books and teaching media, such as, VTR tapes, slides, movie films. This system stores all data about catalogs, indexes, prices, periodicals, abstracts, etc. This data storage can be used for online inquiry applications. With the learning resources information system, users can use terminals to check the books, papers, articles, or media they need.

Student Services Information System

This system stores fundamental data of currently enrolled students and in-school data of graduates including courses, credits, GPA, living records, family status, educational background, alumni, etc. Also, occupational placement and guidance are established. By using the computer the following advantages can be obtained: (a) quickly retrieve student files, (b) provide teachers with detailed student data to improve the effect of instructions, (c) provide detailed data for student counseling and guidance, (d) quickly handle student attendance, (e) quickly handle students who are involved in accidents, and (f) easily access a student's activity status.

Curriculum Management Information System

This system stores all data about courses, course outlines, teaching hours, handouts, classroom allocation,

credits, required and selected courses, scores (GPA), etc., which can be used to prepare instructional plans and qualifications of students.

The objectives of this information system are as follows: (a) establish curriculum data for planning study programs and monitoring instructions, (b) retrieve teachers' teaching courses and hours and provide for computing their payrolls, (c) record the outcomes of educational evaluation to improve instructions, and (d) store teaching materials and handouts so that they can be appended or modified easily.

As mentioned before, although the computerization of school administration is carried out by six information subsystems, the intercommunication and interconnection of data among them are of critical importance. Certainly, part of the success of the overall computerization scheme lies in the flawlessness, completeness and integration of each data base. Figure 5 demonstrates the interrelationship among the six divisional systems.

Insert Figure 5 about here

A Way toward School Computerization in Taiwan, Republic of China

Over the past years, it has been very difficult to

put computers to use in school administration because we were faced with problems resulting from (a) the expensive terminals or computer systems with Chinese capability, (b) lack of software for school administration, (c) shortage of advanced data processing personnel, and (d) lack of recognition on computer applications.

Now, this situation no longer exists. With our government's drive on computer technology in Chinese terminals, workstations, personal computer network, software design, as well as expert system, Chinese terminals or powerful personal computers are available and help to meet the needs of administrative computerization. For example, we can utilize the IBM PC/XT personal computer and Chinese type software to display or print out the high quality Chinese reports.

Moreover, most of the educators and administrators have understood that the promotion of administrative efficiency will depend on the use of computers. In fact, most universities and some junior colleges have developed some software used for school administration. Nevertheless, to develop an effective data base management system there still needs to be more effort to get our people involved.

The need for computerizing school administration is keenly felt at junior college and high school level. To

keep pace with school demands, the Ministry of Education has undertaken a series of training projects to upgrade computer awareness and applications for teachers and faculty members of high schools and junior colleges. However, we may say that building computer manpower resources on school administrative application is just beginning.

Realizing the needs at this initial stage, the Ministry of Education has signed a cooperation agreement with a local computer company to develop a package to be used for school administration. This package includes four information systems: (a) Student Information System, (b) Curriculum Information System, (c) Equipment Information system, and (d) Personnel Information System.

The Ministry of Education also plans to have its computer system connected with those of universities to form a computer network to share the information they have.

Taiwan Provincial Government, Department of Education is also developing a custom-written package to be used by all senior high schools. The package includes: (a) Student Information System, (b) Student Activity Information System, (c) Personnel and Payroll Information System, (d) Library and Public Documentation Management System, (e) Finance Information System, and

(f) Facilities and Physical Devices Management System.

Management computerization has been introduced into many of the enterprises and government institutions in Taiwan, Republic of China. However, computer applications are relatively limited as compared with those of America. We hope that the day all our faculty members become computer-literate workers via our concentrated efforts toward computerized school administration will come soon.

Human Factor of Computerized School Administration

There is little doubt that computer use has had a strong impact on many people. The human factor also exists in computerizing school administration.

Change of Organizational Climate

The use of computers in school administration can result in job obsolescence and displacement for some workers. This makes it possible that faculty groups will be reorganized or disbanded. Such changes can lead to some faculties resistance and organizational stress. Also, the faculties may try to prove the computer system ineffective or to resist using it. In order to avoid and eliminate the problem, some approaches may be useful: (a) select the best time to carry out computerization, (b) create a user friendly management information system, (c) perform end-users education, and (d) establish a

comfortable working environment.

Information Security and Privacy

The lack and inappropriateness of control over system security can lead to the invasion of individuals and organizations' legitimate right to privacy and result in undesirable consequences, such as, economical loss, inconvenience and loss of privacy. As computer systems become more popular, much more unauthorized users gain access to the shared and non-shared resources. How to protect computerized school administration system has become an important issue.

The Prospective School Administration Computerization

The constantly progressing computer technology has had great influence on our human society, especially on information processing. The information processing today has become a new, sophisticated and bright field of technology, very different from that two or three decades ago. Both Electronic Data Processing (EDP) and Management Information System (MIS), developed in the early years, deal primarily with calculation and data processing only. With the combination of newly developed high technology and artificial intelligence, computer system has begun to help with human decision-making since 1970s; hence, it turns out to be Decision Support System

(DSS). In other words, the future computer system will coordinate human decision-making behavior with computer data and help make the best policy.

An inevitable trend for the development of school information system will be the resources sharing system networking. Computers in different schools will be linked by wired or wireless communication media. Thus, academic study reports, instructional resources and other kinds of valuable information are always available to every faculty member and student in the schools of the area. Lots of expenses can be saved when information is obtained from other countries by satellites.

Conclusion

As we know, school business is routine work, which is done repeatedly every year with little variation. It usually takes a much longer time, when it is done manually; more mistakes occur than when processed by computers. Computerization simplifies managing procedures. The data required will instantly be displayed on the screen if we give the keyboard a few punches, so to speak. It is obvious that there are advantages in school administration computerization, such as, reducing the personnel cost, increasing the administrative performance, and providing correct information rapidly for decision makers. This is,

therefore, particularly helpful in promoting the effort to improve the quality of teaching and the effect of learning. On the other hand, the application of computer technology to school administration can be a shock to the staff who cling to the traditional way of handling school affairs. It is imperative that administrative personnel be well trained. Channels should be offered to them for freely expressing their opinions if school administration computerization is to be successfully carried out. After all, when you are well prepared half the job is done.

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Figure Caption

Figure 1. A basic computer system structure.

Figure 2. A comparison of the four generations of computer.

Figure 3. A system architecture of the Fifth Generation Computer Project.

Figure 4. Relationships among operational divisions of school administration system.

Figure 5. Interrelations among the six divisional systems.

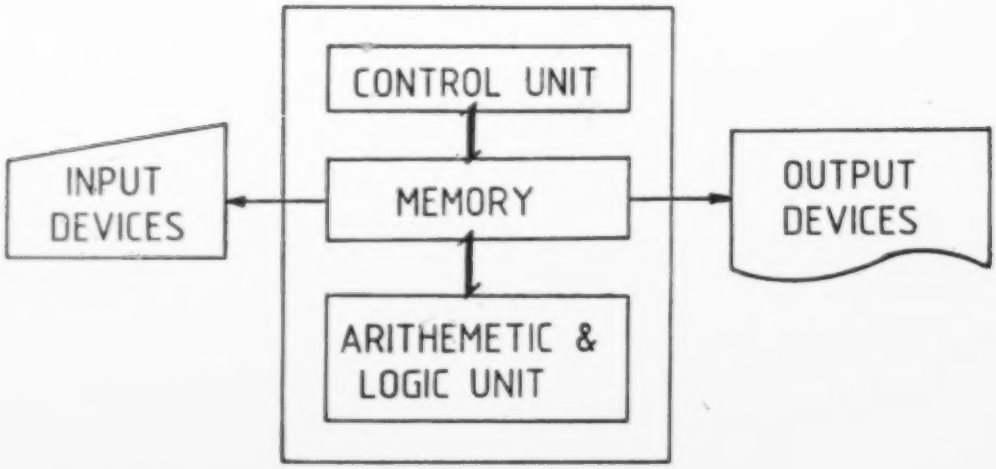
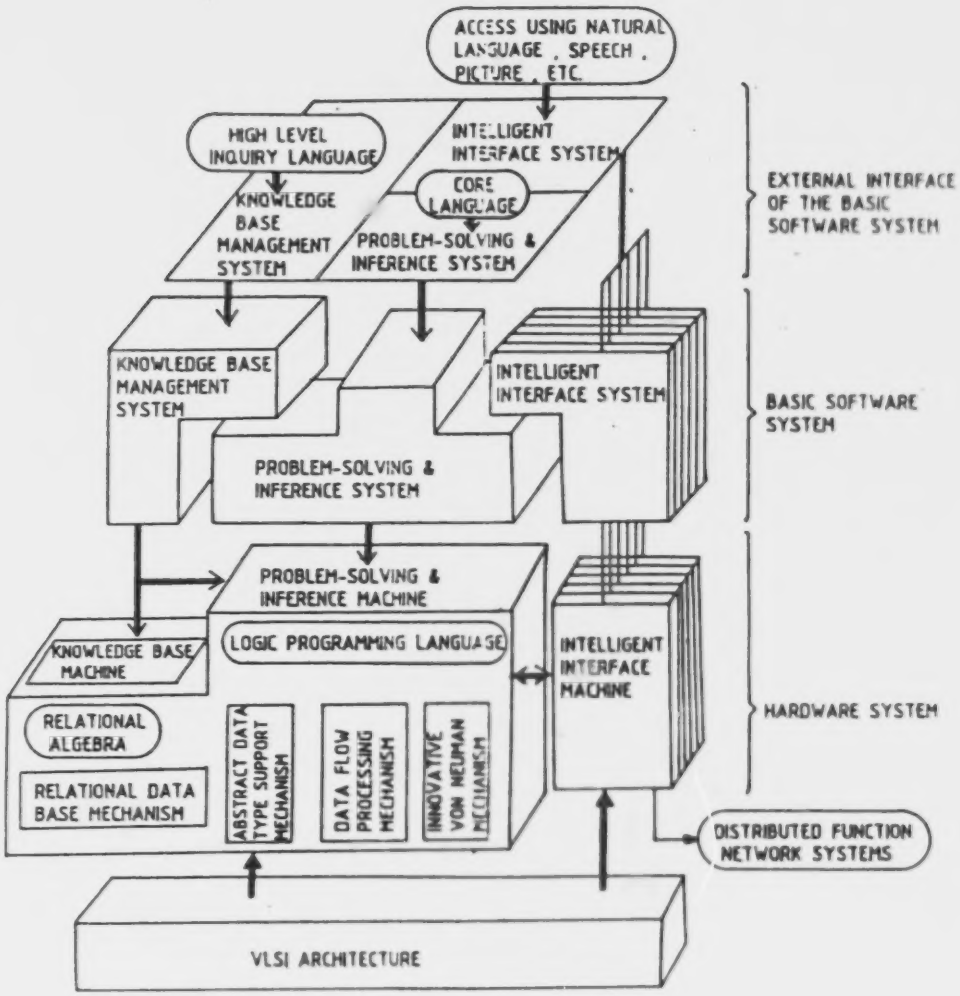


Figure 1. A basic computer system structure

GENERATION ITEM	FIRST	SECOND	THIRD	FOURTH
YEARS	1945-1957	1958-1963	1964-1969	1970-
PARTS	VACCUM TUBE	TRANSISTOR	I . C.	VLSI
PARTS SIZE	THUMB	FINGER	PENCIL CORE	NEEDLE TIP
SPEED	1 MS	1 US	1 NS	< 1 NS

Figure 2. A comparison of the four generations of computer



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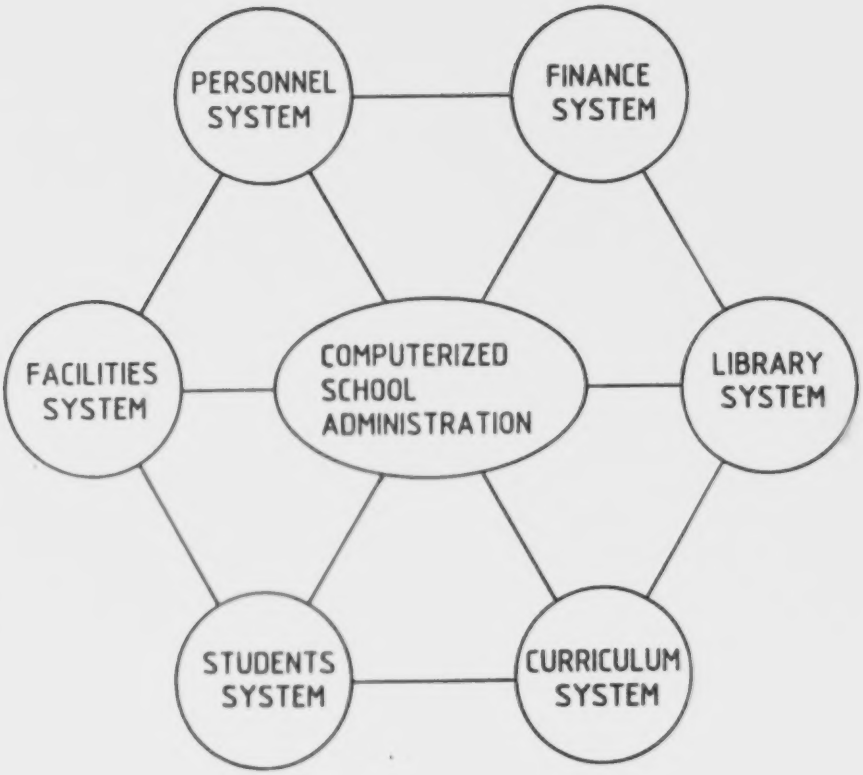

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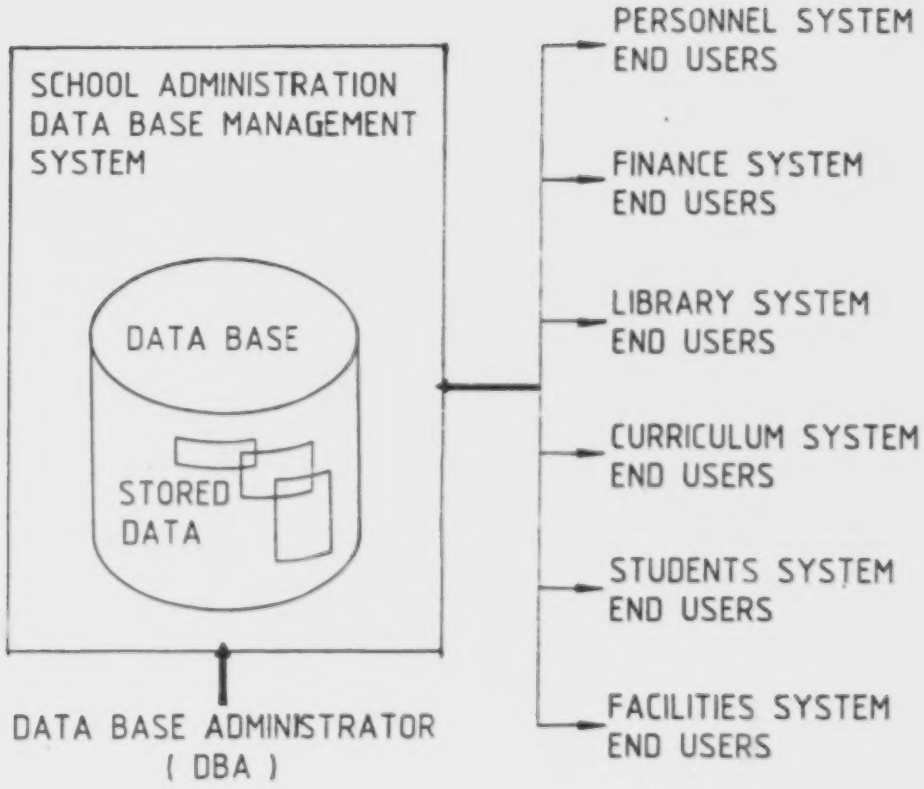

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